

Element 118 Cross Section Limits with the $^{208}\text{Pb}(^{86}\text{Kr},n)^{293}118$ Reaction

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Experiments used in the previously reported synthesis [1] of element 118 with the $^{208}\text{Pb}(^{86}\text{Kr},1n)^{293}118$ reaction were repeated during April-May, 2001. No events corresponding to the synthesis of element 118 were observed with a total beam dose of 3.9×10^{18} ions. The upper limit cross section (assuming 1 event) was as low as 0.7 pb, and limits of less than 3 pb were reached for compound nucleus excitation energies from 10.0-16.8 MeV ($444.5 \leq E_{\text{lab}}(\text{MeV}) \leq 454.0$), covering magnetic rigidities for the recoiling element 118 products from 1.94-2.18 Tm.

These one-event cross section limits (assuming one event where zero were observed), are shown in Fig.1.

Reanalysis of the data from the 1999 experiments showed that the previously reported element 118 event chains are not in the original data files.

The current results constrain estimates of the possible synthesis of very heavy nuclei in cold fusion reactions.

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[1] V. Ninov, et al., Phys. Rev. Lett. 83, 1104 (1999).

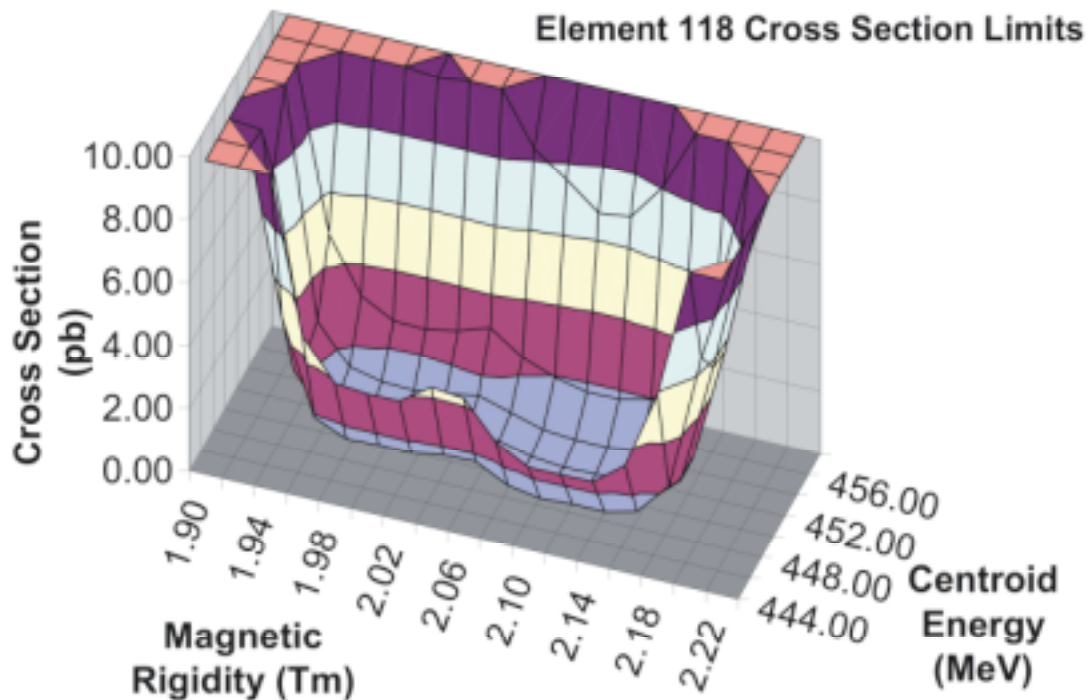


Fig. 1. One-event cross section limits for production of $^{293}118$ in the $^{208}\text{Pb}(^{86}\text{Kr},n)$ reaction. The experimental sensitivity is plotted as a function of the assumed magnetic rigidity of the 130-MeV $Z=118$ recoils in the He fill gas, and the centroid of an assumed Gaussian excitation function with a FWHM of 5 MeV in the laboratory frame.